INNOVATION THROUGH KNOWLEDGE SCIENCE AND KNOWLEDGE MANAGEMENT SUPPORTED BY SOFT SYSTEMS METHODOLOGIES

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ABSTRACT

Knowledge Science (KS) and Knowledge Management (KM) have become more important in the last decade. An authentic revolution has occurred in this field. Many studies and surveys were conducted among doctoral and post-doctoral researchers who were studying these subjects to define the Knowledge Science content : creativity, systematic application of knowledge, human science and methods of knowledge transfer, knowledge utilization and knowledge creation.

It has been hard to define the content of Knowledge Management as an interdisciplinary field. Several different definitions have been proposed. In spite of that, it is well known that Knowledge Management focuses on organizing general management to achieve its mission, improve its competitive advantage and develop organizational competences through that knowledge.

Several models have been proposed which cover a lot of factors, entities, functions, events and support. Factors for considering all the needed variables, entities for answering what does KM deal with, functions for defining how to implement KM, events for studying main situations and support to enable us with the available tools.

Creativity and innovation are keys to obtain results. The available models should be analyzed, from the simplest to the most sophisticated, by means of a systems analysis methodology. When a model for improving an specific innovation system is applied it is convenient to select and utilize a soft system methodology (SSM) to promote the change process.

In this paper several KM models are analyzed and one additional model, coherent, integral and applicable in most common problems is proposed. Besides that the paper focuses on discussing the relationships between Knowledge Management, creativity, innovation and technological development.

Several partial problems and solutions are considered in this KM study: 1. Organization of knowledge data and information, 2. Utilization of this knowledge in internal processes, 3. New knowledge creation and finally, 4. Integration of new knowledge in the organization.

Keywords: Knowledge science, Knowledge Management, creativity, innovation, Soft System Methodology.

INTRODUCTION

Knowledge Science, Knowledge Management, Knowledge Economy and Knowledge -Based Development

Knowledge Science(KS) and Knowledge Management (KM) have became more important in the last decade. In this field there are a lot of studies and surveys to define the Knowledge Science content : creativity, systematic application of knowledge, human science, methods of knowledge transfer, knowledge utilization and knowledge creation.

KM is a multi and interdisciplinary field. From the practitioners point of view Knowledge Management focuses on organizating general management to achieve its mission, improve organizational competitive advantage and develop organizational competences through knowledge.

System Thinking ST has been supporting with definitions, methodologies, practices and applications providing methodological guidance to solve problems in KS and KM..

By means of these disciplines, several models have been proposed to represent the Knowledge system in different contexts. It covers many factors, variables, entities, functions and events. KM deals with functions, entities and events to implement a solution and support this process by providing us with the available tools.

Now Knowledge Management is increasingly viewed as a crucial factor for attaining organizational, sustainable competitive advantages. Lu Liu., Jing Li., Chenggong Lv (2009).

Recently, a new field has emerged, Knowledge Economy. It creates, distributes and uses knowledge to generate value and gives the information to a society which wants to learn to improve its economic position. This access allows individuals and firms to take advantage of the knowledge and increase its economic and social value.

Knowledge-Based Development

Most Knowledge –Based Models have, a main purpose, human or entrepreneurial development in economic, social or technological aspects. The most advanced models have an evolutionary perspective and sustainable performance. Besides that, the knowledge strategies are oriented to value creation within the model's purposes.

Knowledge-Based Development (KBD) is a powerful strategy for economic growth through participation in the knowledge economy.

The society efforts link the economic and human dimensions of knowledge –based development in order to learn how to make decisions for better sustainable solutions. In this process it is necessary to line up the individual and organizational behaviors.

KNOWLEDGE MODELS EVOLUTION

Many models have been proposed in Knowledge Managements. In this paper I selected several of them in order to show their evolution.

- Several Conceptual Models from different authors
- Knowledge Map Structure. Lu Liu., Jing Li., Chenggong Lv (2009)

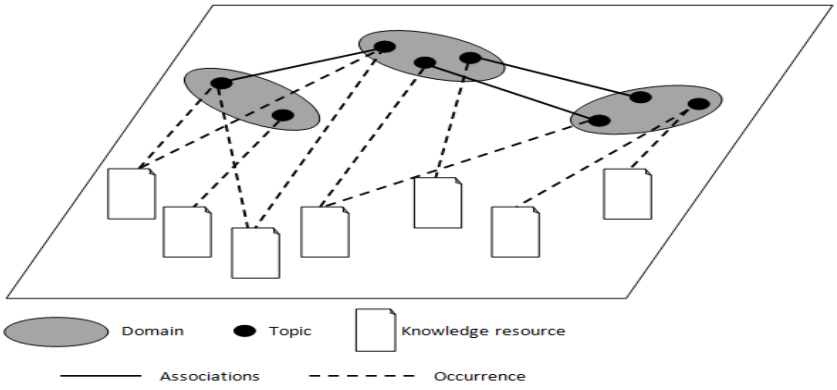

Figure 1. Knowledge map structure

- Arboníes First generation KM model. Arboníes,A. (2006).

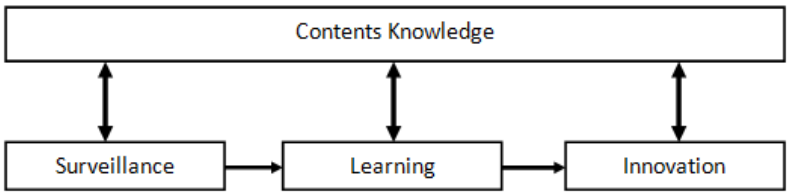

Figure 2. The KM First Generation

- Arboníes Second Generation KM model. Arboníes,A. (2006).

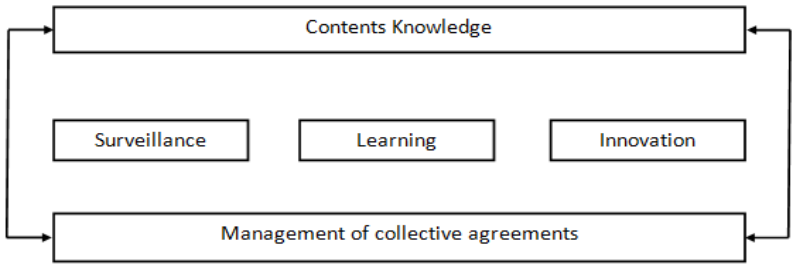

Figure 3. The KM Second Generation

- Arboníes Third Generation KM model. Arboníes,A. (2006).

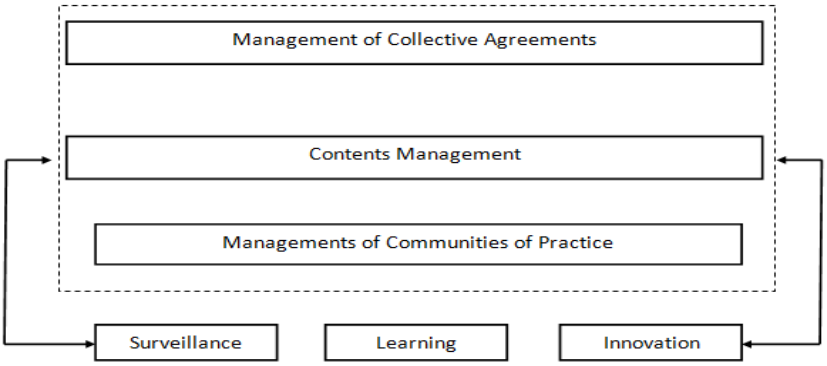

Figure 4. The KM Third Generation

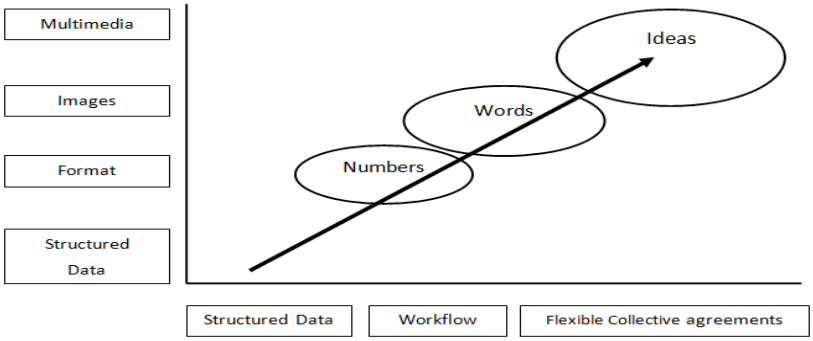

Figure 5. Trend of Contents Management

- Kawalek Knowledge Development System. Kawalek, J. (2004).

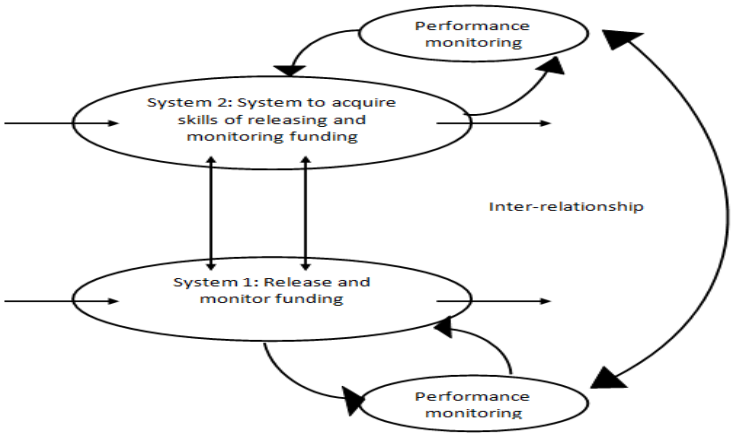

Figure 6. An example of two interrelated subsystems and how the performance monitoring activities tended to be separated

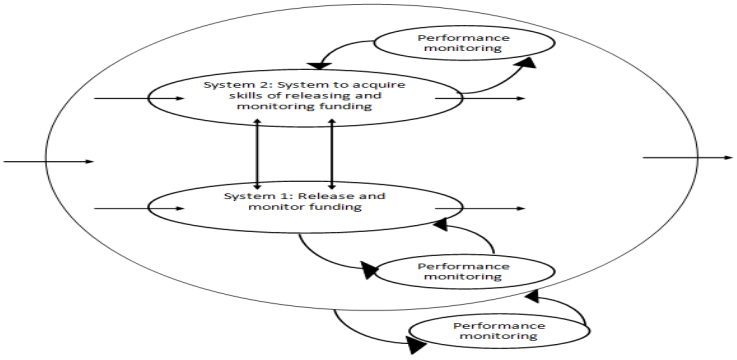

Figure 7. A system of inquiry to evaluate knowledge management initiatives

- Habermasian Inquiring System. Block and Radial views.
- Laszlo and Castro conceptual, evolutionary, sustainable Knowledge-Based Development Model. Model. Castro, K., Laszlo, A. (2007).

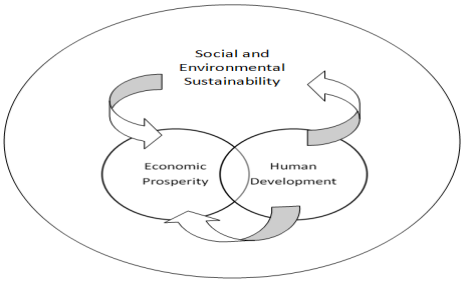

Figure 8. The three purposes of KBD

- Shou, B Model of Comprehensive MF chart. Shou, B., (2006).

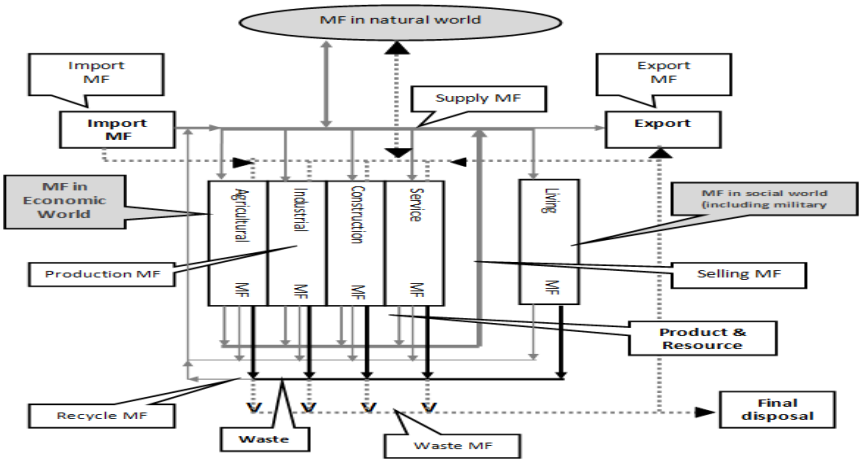

Figure 9. Comprehensive MF chart

- Bosch, Ross and Beeton models of sustainable resource management practices. Bosch, O., Ross A., Beeton, R. (2003).

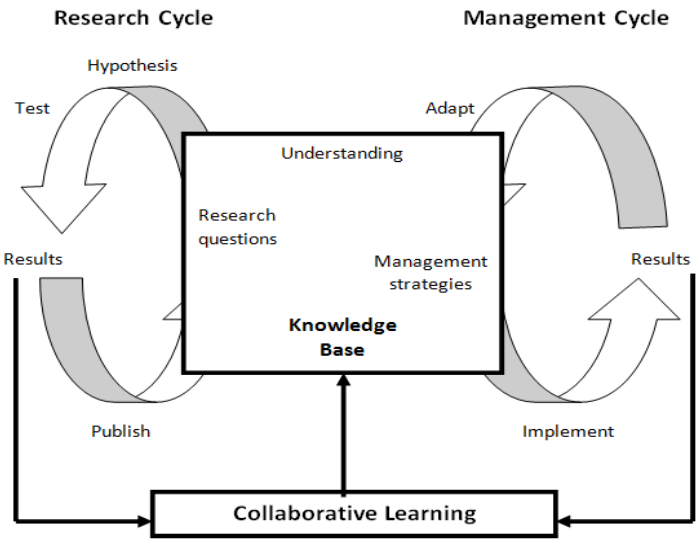

Figure 10. Linking research and management through collaborative learning and an integrated knowledge base

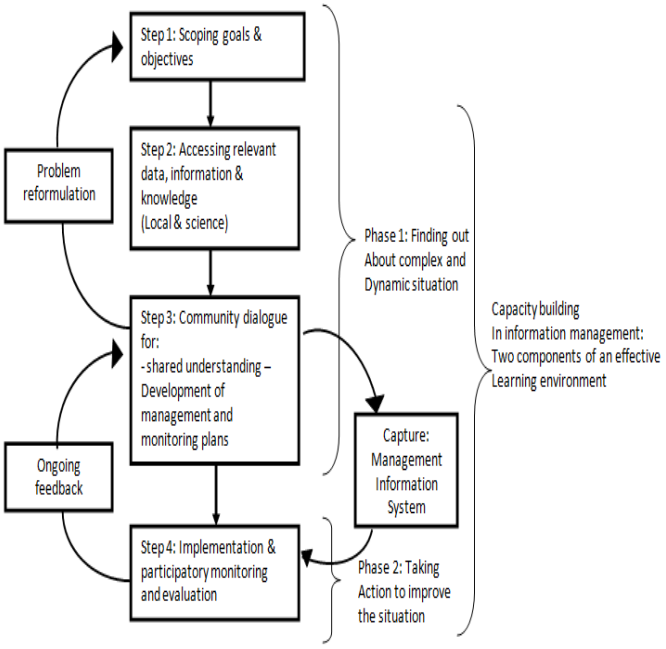

Figure 10. A participatory research framework to help identify and introduce more sustainable resource management practices.

KNOWLEDGE DATA AND INFORMATION

The first step to have a Knowledge Data Base is to build a Knowledge Map. This is an effective instrument to achieve an enterprise KM. It is hard to construct a map since there are a large number of unordered knowledge resources in the enterprises. That is why it is necessary to construct the enterprise knowledge map from a systematic perspective, as well as, to provide a pragmatic solution for knowledge navigation and reuse

A Knowledge map is the display of acquired knowledge included in its relationships. It involves various shared contents such as data, text and graphics. Knowledge mapping is the process of associating like items of information to create additional knowledge.

In this paper it is not possible to present all the techniques and methods that computer science has developed to manage this problem. There are three main methods for constructing knowledge maps, building directories and for making automatic classifications.

SOFT SYSTEM METHODOLOGIES APPLIED TO KM AND INNOVATION

The history of system movement shows several contributions. One of them is the General System Theory, which was designed to achieve cross-disciplinary application of system concepts and tools in complex problems.

In addition to this, Critical System Thinking and Critical System Practice have been used as the main support to solve complex problems in the last 40 years. During this period, Soft System Thinking (SSM) of Checkland, has experienced a long term evolutionary process made possible by this practice.

Checkland´s Soft System Model (SSM) has been reported as one of the most useful methods to deal with several KM tasks: knowledge analysis , set mapping techniques, with focusing on the particular reasons behind system failures to take advantage of available knowledge. It has proved a practical approach, employing soft-systems in diagramming, knowledge representation, cognitive mapping and using them as a framework for knowledge elicitation and for the design of knowledge-based systems with learning capabilities. Paucar, A., (2009)

Other interesting application of SSM have been to use it for sharing knowledge in group problem structuring and sharing knowledge among senior managers. Specific software has been developed to integrate the contributions of each member of the group. In this way, they are connecting and increasing their own knowledge with that of other members of the group. Many papers report other interesting applications of SSM. The Viable System Model VSM of Staford Beer has also several applications to KM. Paucar, A., (2009)

THEORY AND PRACTICE IN INNOVATION.

Innovation is a result of sharing knowledge. So KM is a discipline which supports the innovation process. Managing Innovation can be carried out with the incorporation of systems concepts and SSM methodologies into a powerful tool: Innovation Architecture methodology (IA).

There are several successful experiences of IA applications related to entrepreneurial processes. IA has two objectives: formulation of innovation strategies and managing the innovation formulation and reformulation process by using an integrative view.

Benchmarking is other efficient methodology for training human resources in enterprises. It is applied individually or in groups.

NEW KNOWLEDGE CREATION AND INTEGRATION IN ORGANIZATIONS.

KM research community is fragmented. That is why there is a lack of mutual understanding on conceptual, methodological and theoretical issues. It is necessary to have a framework to develop KM. There are many important subjects contained in this multidisciplinary field; this wide variety of disciplines have their own theories and practices. Among them, the discipline management science, decision –making, environmental studies, knowledge science, information systems, computer science are the most important.

KM has several purposes reviewing and organizing knowledge content to integrate it to enterprises, and to create new knowledge. However the most sophisticated issue is a new knowledge creation.

The dynamics of knowledge flows makes necessary to understand three concepts: knowledge creation, knowledge normalization and knowledge application. Individual and groups acquire knowledge over time through experience, analysis and reflection. The force of the social reality helps to shape the specific value system which is going to be a guide for acting and making decisions.

The gap between the actual and the desired situation helps to improve actions to obtain better results. Also the Habermasian inquiring system provides a proper framework to initiate a research in KM where all interests are considered.

PROPOSED MODELS

After reviewing several models, in order to contribute to improve its integrative point of view, following two figures are presented to initiate a holistic analysis.

- Conceptual Integration of models of Knowledge Management, Creativity, Innovation and Technological Management.
- Detailed Integration of those models

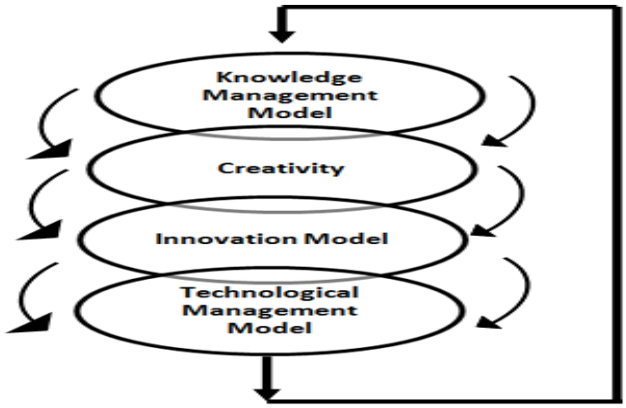

Figure 11. Integration of models of knowledge management creativity innovation and technological management

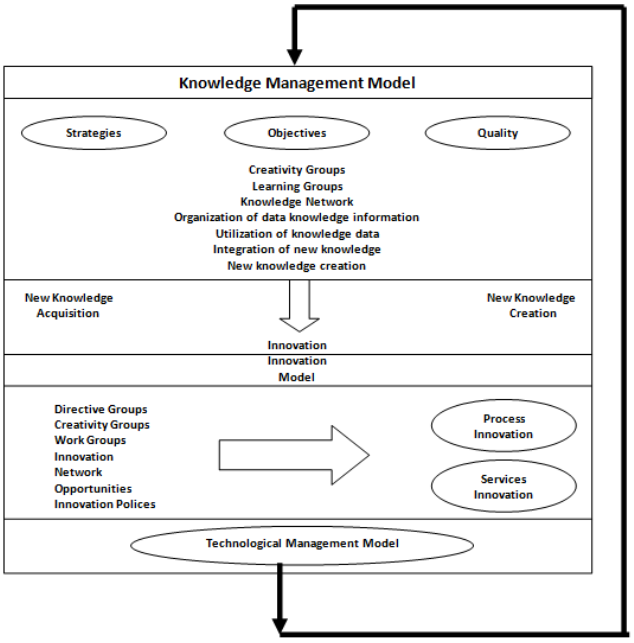

Figure 12. Detailed integration of models

CONCLUSIONS

- Knowledge Science and Knowledge Management contents have a wide variation according to different authors. Creativity, systematic application of knowledge, human science and methods of knowledge transfer, knowledge utilization and knowledge creation are the most important issues.
- Several tools, mentioned in the paper, have proved their efficiency to help in the formulation of knowledge and innovation strategies.
- There are many KM models in technical literature. Most of them are supported on SSM.
- The proposed model has an integrative view of the problem .and contributes to improve solutions in this field.

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